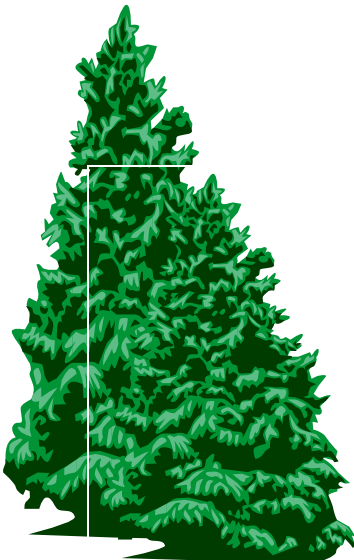
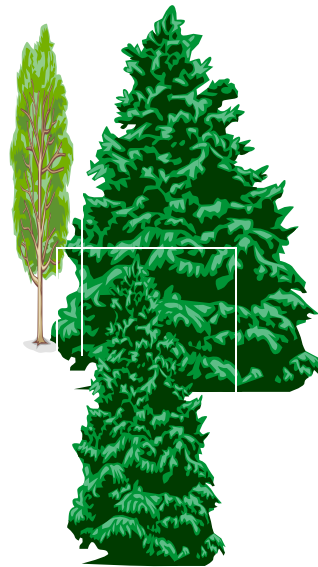


Lake Whatcom Landscape Plan Upland Wildlife Habitat Assessment



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Introduction

The Lake Whatcom landscape planning area lies immediately east and southeast of the city of Bellingham in Whatcom County, with the southernmost portion of the planning area located in Skagit County. The planning area includes state-managed lands that lie within the Lake Whatcom watershed boundary, a block of land west of Cain and Reed Lakes, and smaller parcels adjacent to the watershed. A total of approximately 15,707 acres of state-managed lands are included within the planning area. Lake Whatcom is the most significant landscape feature in the planning area and serves as the municipal water supply for approximately 66,000 residents of the city of Bellingham. Urban development is the primary use at the west end of Lake Whatcom and in Sudden Valley, at the mouth of Austin Creek. Approximately 68% of the watershed area is designated as Aforest land@.

Elevations range from 310 feet at the lake outlet to over 3,200 feet atop the highest ridges of Anderson Mountain to the south. Slopes are quite varied in the planning area, ranging from nearly flat along the lake to very steep (90% slope) in some areas. Soils are usually shallow (less than three feet deep) and originated from glacial till, bedrock or colluvial deposits. The area has a maritime influenced climate with cool, dry summers and mild, wet winters influenced by air currents from the Pacific Ocean and Puget Sound. Average annual precipitation ranges from about 45 inches in the lower elevations to 60-75 inches along the higher ridges. Most precipitation occurs as rain during the months of October through March, though snow at the upper elevations is not uncommon.

The majority of the planning area is located in the Western Hemlock Zone (Franklin and Dryness 1973), with conifer stands dominated by Douglas-fir (*Pseudotsuga menziesii*) and western hemlock (*Tsuga heterophylla*), with a western redcedar (*Thuja plicata*) component in many areas. Hardwood dominated stands are common along riparian areas and some of the lower elevations and are composed of red alder (*Alnus rubra*), black cottonwood (*Populus trichocarpa*), and bigleaf maple (*Acer macrophyllum*). Understory vegetation is dominated by sword fern (*Polystichum munitum*) and huckleberries (*Vaccinium* spp.). Salmonberry (*Rubus spectabilis*) is common in riparian zones and dwarf Oregon grape (*Berberis nervosa*) is common on drier sites.

The scope of this upland wildlife habitat assessment is limited to state trust lands within the planning area that are owned by the State of Washington and managed by the Department of Natural Resources. Known wildlife occurrences on private lands within the planning area are also assessed. Fisheries related assessments are addressed separately in this Landscape Plan.

I. Upland Wildlife Habitat Conditions in the Lake Whatcom Landscape

A. Forest Development Stages

Forest stands are influenced by both natural processes and management activities. Stands are very dynamic, changing over time and progressing through different stages as trees become established, grow, and eventually die. In young stands, changes occur relatively rapidly and are readily apparent, but changes are more subtle and difficult to detect in older stands. For the purpose of this plan, criteria used for delineating stand conditions were modified from forest stand development stages found in a U.S. Forest Service publication entitled *Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington* (Brown 1985). The stand development stages identified within this publication correspond to certain structural characteristics which may be found in the landscape following timber harvest, which has been the most common type of disturbance activity to forested lands within the planning area. Additionally, the stand conditions outlined in Brown's document were used in the DNR's 1997 Final Habitat Conservation Plan (HCP) for classifying wildlife habitat types. For this habitat assessment, forest stands were identified in general terms using the stand condition stages and their associated age classes as outlined from the above literature.

For this assessment, stand conditions were identified and assessed using DNR's Forest Resource Inventory System (FRIS) database. Field verification should be conducted for more precise identification, assessment, and analysis of actual stand conditions.

Grass-forb stand condition (0 - 5 years): This initial development stage occurs immediately after timber harvest. Shrubs are less than 40% crown cover and less than five feet tall. Annual grasses and forbs dominate, some perennial plants become established. Pioneering species and those which grow rapidly at first reoccupy the available growing space. Trees are usually planted in the spring after harvest, but do not significantly influence vegetative composition for three to five years.

Shrub stand condition (6 - 15 years): This condition generally follows the grass-forb condition as shrubs become dominant enough to change the habitat for wildlife. Planted trees range from two to ten feet tall. If regeneration fails, this shrub condition may last for many years. Shrubs are any height and occupy greater than 40% crown canopy; trees are less than 40% crown canopy and average less than one inch diameter at breast height (dbh).

Open sapling-pole stand condition (16 - 30 years): This stage follows the shrub condition as a result of tree height growth when tree density is low and crowns have not closed. This condition can be bypassed if tree densities exceed 400 trees per acre and crowns may close before the stand averages one inch dbh. An open stand with a good shrub understory is very different wildlife habitat than a stand with the same average diameter and a closed crown canopy. This condition is defined as a stand with average tree diameters greater than one inch dbh, with tree crown canopy less than 60%. Saplings are one to four inches dbh, poles are four to nine inches dbh.

Closed sapling-pole-sawtimber stand condition (31 - 80 years): This condition is a closed crown canopy forest with average tree diameters less than 21 inches dbh. Sparse ground vegetation is present, crown canopy closure exceeds 60% and often reaches 100%. This stage provides the least favorable conditions for wildlife and contains the lowest levels of biodiversity. Length of time in this condition is determined by rotation age and thinning treatment. If stands are thinned and long rotations used, this condition can develop into A large sawtimber@ or eventually A old-growth@ conditions. The majority of state lands within the planning area are in this development stage, with approximately 10,728 acres (68%) in this stand condition.

Large sawtimber stand condition (81-200 years): This condition is composed of trees averaging 21 inches dbh or larger with crown cover less than 100%, resulting in some ground vegetation and diversity of plant species. This condition is distinguished from A old-growth@ conditions in that decay and decadence are lacking and dead and down material is deficient. Depending on thinning treatment and rotation age, this condition may also persist for many years.

Old-growth stand condition (200 - 700 years): This condition is characterized by large diameter trees exhibiting a high degree of decadence, decay, and dead and down woody material. Generally overstory trees have less than 100% crown closure, two or more canopy layers and are greater than 200 years old. Wildlife habitat conditions are closely associated with the condition of the large diameter trees. Length of time in this condition is primarily determined by the longevity of the dominant tree species, though this condition is not necessarily the climax condition. Stands in this condition are presently absent from the planning area.

B. Present Forest Conditions

1. Background

Settlement by Euro-Americans within the Lake Whatcom watershed began during the 1870s. Extensive railroad logging during the 1880s-1920s is primarily responsible for the upland wildlife habitat conditions currently found in the planning area. Logging within the watershed accelerated after the completion of a railway in 1892 connecting the south end of Lake Whatcom

to Bellingham Bay along the eastern shore. Logging generally began at the southeastern end of the lake and proceeded northwesterly. By the time of World War I, most of the original forests around the lake were harvested. This suggests that initial logging reached its peak during the period 1890-1915. Timber harvest activities were less frequent from 1920 through the 1970s, due to the younger forest stands present after harvest of the original forests.

Significant timber harvest activities resumed in the 1980s as stands came of merchantable age and size. During this time, population growth in the county and residential development in the watershed also increased. Public concern about the affects of timber harvesting on water quality, aesthetics and wildlife habitat increased. Since state-managed timber lands are managed on a more sustainable basis, an effort to transfer lands in the watershed to the state was initiated. In 1992, through a land exchange with Trillium Corporation, the state became the majority forest landowner, adding nearly 5,000 acres to state ownership.

2. Current Stand Conditions

State lands within the planning area are currently dominated by mid-seral forests in the closed sapling-pole-sawtimber condition (Map J-1 – Age class distribution). Approximately 68% (10,728 acres) of the planning area is composed of forested stands between 30 - 80 years old. Of these acres, approximately 5,855 acres contain stands between 61 - 80 years old, which is the typical rotation age on actively managed state lands.

Approximately 16% (2,535 acres) of the planning area is composed of stands greater than 81 years old (A large sawtimber@). Of these acres, approximately 599 acres are composed of trees greater than 100 years old, representing less than 4% of the state lands within the planning area. Only 118 acres (less than 1%) of the planning area is comprised of stands between 121-200 years of age.

Approximately 11% (1,734 acres) of the planning area is comprised of stands between 6 - 15 years old (A shrub@). Approximately 2% (376 acres) is between 16 - 29 years old (A open sapling-pole@). The remaining 2% (374 acres) are between 0-5 years of age (A grass-forb@). Another 220 acres (1%) within the planning area are permanently non-forested (powering right-of-way, communication sites etc.) and could be included in the A grass-forb@ condition.

3. Primary Tree Species Composition

FRIS inventory data was assessed to determine primary tree species composition within the planning area, as determined by the highest basal area for tree species present within a given forest inventory unit (FIU) (Map J-2 – Species distribution by basal area).

Douglas-fir dominated stands represent approximately 51% (7,979 acres) of the forested stands within the planning area. Red alder dominated stands are also well represented, with 22% (3,527 acres) of the forested stands containing this species as the primary species. Western hemlock dominated stands comprise 20% (3,156 acres) of the planning area. Stands dominated by western redcedar comprise only 5% (760 acres) of the forested stands. Relatively small areas are dominated by stands composed primarily of bigleaf maple (2% - 250 acres) and Pacific silver fir (*Abies amabilis*) at less than 1% (67 acres).

Vegetative conditions and their spatial configuration on the landscape likely provide suitable habitat for a wide variety of wildlife species (see Appendix A) within the planning area. Due to the scarcity of both early- and late-seral stages, overall wildlife diversity is likely somewhat lacking as these seral stages generally support a greater variety of wildlife species than the mid-seral stages which predominate the landscape at this time. Comprehensive wildlife inventories have not been conducted in the planning area but it is reasonable to expect that trust lands support breeding populations of mammals, birds and amphibians typically associated with the habitat types found there.

4. Snags

A snag is defined as a dead or partially dead tree. The occurrence of snags contributes substantial vertical and horizontal diversity to forest structure, and helps provide for a rich and varied wildlife community. In forests of Oregon and Washington, snags are used by nearly 100 species of wildlife, of which at least 53 species are cavity-dependent (Brown 1985).

Snag sizes and densities derived from FRIS data were assessed for the planning area (Map J-3 – Snags and Down Woody Debris). The following categories were established from inventory information for the purposes of this assessment: FIU=s with snags between 16 - 20 inches dbh, were broken into two sub-categories; those that averaged between 2 - 4 snags per acre and those that contained greater than 4 snags per acre. Another category identified FIU=s containing snags that were greater than 20 inches dbh, that averaged between 2 - 4 snags per acre and those which contained more than 4 snags per acre.

Within the planning area, approximately 1,674 acres contain snags between 16 - 20 inches dbh and average between 2 - 4 snags per acre. Another 1,304 acres contains snags between 16 - 20 inches dbh and average more than 4 snags per acre. There are approximately 202 acres within the planning area which contain snags in excess of 20 inches dbh and which average between 2 - 4 snags per acre. An additional 68 acres contains snags in excess of 20 inches dbh and averages more than 4 snags per acre.

Snag standards using a USDA Forest Service publication (USDA Forest Service 1996) for a

particular vegetation series in Washington shows that for the Douglas-fir vegetation series, a minimum of 4 snags per acre, at least 20 inches dbh and at least 15 feet in height, provide the most favorable habitat conditions for wildlife. Approximately 64 wildlife species which occur or are likely to occur in the Lake Whatcom landscape use snags for at least a portion of their life requisites. Approximately 42 of those species are known to strongly prefer, or exclusively use, snags for nesting/denning, and are considered snag-dependent (WDFW 1995).

The hardness of a snag is an important characteristic in determining its value for nesting or foraging. Soft snags, usually in the later stages of decay, are most used by cavity-nesting wildlife. Wildlife use of hard snags in the early stages of decay is primarily foraging activity. Retaining or maintaining snags in various stages of decay is preferred for wildlife habitat considerations.

Timber harvest activity in the planning area has reduced the abundance and distribution of snags across the landscape. Given the many species of birds and mammals that depend on this habitat component at one or more points in their life cycles, reduced availability of snags may negatively impact the abundance and distribution of some of these species in the planning area, though specific data is lacking. Recruitment of large diameter, new snags should be a priority in maintaining this important habitat component and the wildlife diversity associated with it.

5. Down Woody Debris

Down woody debris is defined as any woody material that is dead and lying on the forest floor. Dead and down woody material is important to a forest ecosystem for mineral cycling, nutrient mobilization, and natural forest regeneration. Additionally, down logs create structure and a diversity of habitat types that are important to a large number of wildlife species, both terrestrial and aquatic. In forests west of the Cascades crest in Oregon and Washington, 150 terrestrial wildlife species are known to utilize dead and down woody materials as either a primary or a secondary component of their habitat (Brown 1985).

Down woody debris standards identified in a USDA Forest Service publication (USDA Forest Service 1996) for a particular vegetation series in Washington, shows that for the Douglas-fir vegetation series, a minimum of 4 pieces per acre, at least 24 inches in diameter, at least 50 feet in length, and in varying stages of decay, provide the most favorable habitat conditions for wildlife species.

FRIS data was assessed to determine which lands within the planning area contained volumes of down woody debris in excess of 2400 cubic feet per acre*, on average (Map J-3). This assessment determined that approximately 5,536 acres (35%) have levels of down woody debris accumulations. The majority of this material is in decay classes 3 - 5, indicating that this

material has been in place for some time and likely originated with the initial logging of the area or was in existence prior to that time. Recruiting newer material into this important habitat component of sufficient size to persist for long periods would be beneficial to numerous wildlife species, particularly in those areas within the planning area that are presently deficient in down woody debris.

*The volume of 2400 cubic feet of down woody debris was derived from the HCP spotted owl conservation strategy=s minimum threshold habitat requirement for northern spotted owls. This minimum volume threshold was identified in this landscape plan as simply a guide until more data to determine sufficient down woody debris thresholds can be analyzed using the Forest Resource Inventory System.

C. Forest Complexity and Structural Diversity

Forest stands can be described in terms of plant species composition, structure and site quality. Species composition refers to the variety or species richness of plants found within a given stand. Structure can be described as the variety of the vertical and horizontal arrangement of trees, shrubs, forbs, grasses, mosses etc. and also snags, dead and down material, and conditions on the forest floor. Site quality refers to a combination of factors (soil composition, depth, and fertility and climatic conditions) that influence plant growth.

Biological diversity has several aspects, which include the number (variety) and abundance (evenness) of species present in a stand; the genetic variation among individuals within a species; the variation in species and their abundance among stands and across landscapes; and the variation in presence and structure of canopy layers within and between stands and across landscapes (Curtis and others 1998). Different wildlife species tend to be associated with different forest stand conditions. In order to provide and maintain habitat for a wide variety of wildlife species, a balanced distribution of forest stand structures and developmental stages needs to be developed and maintained across landscapes.

Characteristics of forest stands important to some wildlife species include: the presence of large live trees; a layered canopy structure which is composed of understory trees and shrubs of varying ages and sizes; a variety of plant species; an abundance of large snags and live trees with cavities or other attributes needed for nesting, roosting and foraging; presence of large woody debris on the forest floor; and canopy gaps that allow a diverse, well-developed, but patchy understory (Franklin, 1997). These characteristics of forest structure commonly develop at advanced ages in natural stands, however, their development may be significantly accelerated in younger stands by appropriate silvicultural treatments (Carey 1996). Achieving these forest stand characteristics throughout the landscape is an important objective for maintaining

biological diversity and a wide variety of wildlife populations.

II. Wildlife Species in the Lake Whatcom Landscape

A. Historical Perspective

It is difficult to determine with complete accuracy what wildlife species historically occurred in the planning area prior to Euro-American settlement due to incomplete records. While it is certain that some species have been extirpated from the planning area, it is also likely that overall wildlife diversity is presently greater than historical levels, due to the greater variety of habitat types presently found in the planning area. Listed in Table X are those species likely to have been present historically and which are no longer thought to occur within the planning area.

Table X: Wildlife species which historically occurred in the Lake Whatcom Landscape and have since been extirpated from the planning area.

<u>Species</u>	<u>Status*</u>	<u>Species</u>	<u>Status*</u>
Northern Spotted Owl (<i>Strix occidentalis caurina</i>)	FT, SE	Marbled Murrelet (<i>Brachyramphus marmoratus</i>)	FT, ST
Gray Wolf (<i>Canis lupus</i>)	FE, SE	Grizzly Bear (<i>Ursus arctos</i>)	FT, SE
Wolverine (<i>Gulo gulo</i>)	FSC, SC	Marten (<i>Martes americana</i>)	None
Fisher (<i>Martes pennanti</i>)	FSC, SE	Elk (<i>Cervus elaphus</i>)	None

* FE - Federal Endangered, FT - Federal Threatened, FSC- Federal Species of Concern, SE - State Endangered, ST - State Threatened, SC - State Candidate

Northern Spotted Owl

The northern spotted owl (*Strix occidentalis caurina*) uses a variety of forest types and stand structures for nesting, roosting, and foraging throughout their range. In western Washington, forest types include Douglas-fir, western hemlock, mixed Douglas-fir and hardwood, and

western redcedar. Spotted owls use existing forest structures for nesting. Nesting habitat generally consists of mature and old-growth stands that contain a high degree of structural complexity such as large diameter trees, snags, a multi-layered canopy, and an abundance of down woody debris. In older stands, northern spotted owls usually select cavities in snags or in broken-top trees for nesting.

Northern spotted owls rely on small mammals for most of their diet, although they also eat birds and insects. Their main prey species are northern flying squirrels (*Glaucomys sabrinus*), bushy-tailed wood rats (*Neotoma cinerea*), mice (*Peromyscus* spp.), red-backed voles (*Clethrionomys gapperi*), and rabbits (*Sylvilagus* spp.) (Thomas et al. 1990).

The northern spotted owl is listed as Federally Threatened by the U.S. Fish and Wildlife Service (USFWS), and as State Endangered by the Washington Department of Fish and Wildlife (WDFW). It is likely that northern spotted owls occupied suitable habitat within the planning area prior to the harvest of the original forests around the turn of the century, though no known records exist. Extensive USFWS protocol surveys of all suitable spotted owl habitat within the planning area were conducted by DNR staff in 1994 and 1995. No spotted owl detections were recorded. Smaller scale surveys for proposed timber sales occurred in 1996 and 1997, again with no detections. State managed lands within the planning area were not identified to play a role for spotted owl conservation in the HCP. Significant areas of state lands elsewhere in Northwest Region were designated as nesting, roosting, and foraging (NRF) or Dispersal managed lands, but these are located in close proximity to U.S. Forest Service ownership in an attempt to support existing spotted owl populations.

Marbled Murrelet

Marbled murrelets are the only members of the family Alcidae that nest in trees. They do not build nests, but use large limbs covered with a thick layer of moss, or use mistletoe brooms or other deformities that create a wide and flat space capable of supporting an egg. In Washington, they nest exclusively in inland mature and old-growth coniferous forests. To date, no murrelet nests have been found in stands younger than 180 years old, with most nest stands being significantly older. In Washington, all nests located have been in low-elevation stands, below 2000 feet and within 25 miles of marine waters, though occupied stands have been located as far as 52 miles inland.

Marbled murrelets are listed as Federally Threatened and State Threatened in Washington. It is likely that marbled murrelets historically occupied suitable old-growth habitat within the planning area prior to harvest of the original forests, but no known records exist. Pacific Seabird Group protocol surveys were conducted to 187 acres of potentially suitable murrelet habitat within the planning area in 1997 and 1998 by DNR staff, as part of a habitat relationships study

in support of the marbled murrelet conservation strategy under the HCP. No murrelet detections were recorded. From this original habitat relationships study, a model of potentially suitable murrelet habitat has been developed for the North Puget Sound Planning Unit, which includes the Lake Whatcom Landscape. The model has identified an additional 417 acres within the planning area that has the greatest likelihood of supporting nesting murrelets. This acreage is scheduled to be protocol surveyed during the 2001-2002 survey seasons to determine if these areas are being used by nesting murrelets.

It is perhaps premature to include marbled murrelets in the category of A historical species within the planning area, given the limited effort for surveys and the lack of general knowledge about the species habitat selection and preferences. However, given the body of knowledge about the types of stands that active nests have been located within Washington forests, it is reasonable to assume that early forest conditions in the Lake Whatcom Landscape provided suitable nesting opportunities for murrelets and that the species utilized these habitats. Harvest of the original forests removed the large trees and structures that murrelets favored and these structures are likely still absent from the existing forest stands, given the present age classes that are represented in the planning area. Planned surveys for marbled murrelets in 2001 - 2002 should provide additional information on the status of this species within the planning area.

Gray Wolf

It is likely that gray wolves occurred historically in the planning area, but were extirpated early in the 1900's as the area was settled and wolves were methodically eradicated from most of their historical range in Washington. Small numbers of wolves are appearing in some of the more remote areas in Washington, it is believed these animals are expanding into their historic range from populations in Canada.

Wolves are listed as both Federally and State Endangered in Washington. Given this species preference for relatively undisturbed large tracts of land with a sufficient prey base of large ungulates, combined with the present levels of human activity within the planning area, it is very unlikely that suitable habitat conditions exist that are capable of supporting gray wolves.

Grizzly Bear

Historically, the distribution of grizzly bears included the western half of North America and they were likely present within the planning area. Human-caused mortality is the major cause of past and present grizzly bear population decline. Due to their low reproductive rates, this species is extremely sensitive to population decline. It is suspected that a small population remains in the most isolated areas within Washington, though confirmed sightings have not occurred for

many years.

Grizzly bears are listed as Federally Threatened and State Endangered in Washington. Due to this species requirement for very large, undisturbed habitats with limited human presence, it is unlikely that suitable conditions exist for grizzly bears within the planning area.

Wolverine

The wolverine has a circumpolar distribution that corresponds with the boreal zone of the northern hemisphere. The historical range of the wolverine in North America included the northern part of the continent southward to the northernmost tier of the United States, with an extension south along the Sierra-Cascade mountains through Oregon into California and along the Rocky Mountains into Arizona and New Mexico. Throughout North America, the wolverine occupies a wide variety of habitats, showing a preference for habitats that are isolated from the presence and influence of humans. Generally, higher rocky areas are preferred during summer and lower elevation coniferous habitats with wild ungulates are used during winter months.

Wolverines are listed as a Federal Species of Concern and are a State Candidate for listing in Washington. A wolverine was struck and killed by a car on Highway 9 just north of Acme in 1997, approximately five miles from the planning area boundary. While this may indicate that wolverine are in the vicinity, it is unlikely that suitable habitat conditions exist within the planning area due to broad scale human influence.

Marten

Martens are found from northern Alaska south into the Rocky Mountains and down into California. Marten are solitary creatures, feeding opportunistically on small mammals (squirrels, rodents etc.), and occasionally on birds, fruit, insects and carrion. Preferred habitat is coniferous forest, where they forage and den in hollow trees, logs, or vacant ground burrows. Trapping for their pelt and loss of forest habitat have likely impacted marten populations, though they are still considered a game species in Washington and have no official status as a listed species.

It is uncertain if marten historically occupied suitable habitat within the planning area, but it is likely they did. Also unknown is whether marten might still exist within the planning area, but it seems unlikely, given their preference for large, contiguous blocks of older forest habitat.

Fisher

Fishers historically occupied much of the forested areas of Washington. Due to trapping, predator control programs, and alteration and loss of preferred habitat, the species has been

nearly extirpated from the state. Fishers are generally associated with late-successional coniferous and mixed coniferous-deciduous forests with high degrees of canopy closure, multiple canopies and shrub layers that support a diverse prey base. Large trees and snags, tree cavities, and logs are preferred for den and resting sites and are considered important components of suitable habitat. Fishers are extremely rare, with an average of less than four sightings per year in the state since 1980.

Fishers are listed as a Federal Species of Concern and a State Endangered species. Due to low reproductive rates and small population, it is possible that this species may become extirpated from the state without an effective recovery plan. Stand conditions within the planning area are approaching conditions that may be favorable for fishers and could be enhanced through silvicultural treatment. However, until this species is able to increase its population in the state, it is unlikely that suitable habitat within the planning area could be utilized.

Elk

Historically, Roosevelt elk occupied all of the lowlands of Puget Sound and through hunting and habitat alteration have been forced into the ranges the species presently occupy in Washington. The elk population originally occupying the Lake Whatcom vicinity were essentially extirpated around the turn of the century, though later augmentations with transplanted Rocky Mountain elk have resulted in re-establishment of what is referred to as the Nooksack elk herd to the east of the planning area, along the main branches of the Nooksack River and eastern Skagit Valley. This herd has been experiencing a significant decline from a population high in the 1980's estimated at 1700 animals, reduced to approximately 300 animals today. Though considered a game species in Washington, this Nooksack population is presently under an emergency conservation closure and no hunting is permitted. Due to the introduction of Rocky Mountain elk, the genetic composition of this herd is now significantly different than those animals which occurred originally.

It is unknown whether habitat conditions within the planning area would be considered suitable for elk, or whether encouraging elk into the planning area would be a desirable objective, given the present difficulties faced by local dairy farmers and others when elk knock down fences to access preferred grazing areas. Given the significant residential development in Sudden Valley and the presence of the golf course, it seems likely that re-establishing elk in the planning area would be discouraged.

B. Wildlife Species of Interest in the Lake Whatcom Landscape

Current wildlife conditions in the Lake Whatcom Landscape were assessed using the

Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species database, Natural Heritage database, DNR=s TRAX data, and personal communications with WDFW Wildlife Biologists (Davison and Caniff 2001). This assessment identified several wildlife species of interest that have been documented within this landscape, and wildlife species of interest whose geographical distribution includes the landscape and are likely to occur within the planning area (Table XX). For a more comprehensive list of species, see Appendix A: List of wildlife species which occur or are likely to occur within the Lake Whatcom Landscape.

Table XX: Wildlife species of interest that have been documented in the Lake Whatcom landscape or whose geographical distribution includes the planning area.

Wildlife species of interest that have been documented in the Lake Whatcom Landscape.

<u>Species</u>	<u>Status**</u>	<u>Species</u>	<u>Status**</u>
Common Loon (<i>Gavia immer</i>)	SS	Great Blue Heron (<i>Ardea herodias</i>)	SM
Osprey (<i>Pandion haliaetus</i>)	SM	Bald Eagle (<i>Haliaeetus leucocephalus</i>)	FT, ST
Northern Goshawk (<i>Accipiter gentilis</i>)	FSC, SC	Pileated Woodpecker (<i>Dryocopus pileatus</i>)	SC
Vaux=s Swift (<i>Chaetura vauxi</i>)	SC	Purple Martin (<i>Progne subis</i>)	SC
Olive-sided Flycatcher (<i>Contopus borealis</i>)	FSC	Tailed Frog (<i>Ascaphus truei</i>)	FSC, SM
Townsend=s Big-eared Bat (<i>Plecotus townsendii</i>)	FSC, SC		

Wildlife species of interest whose geographical distribution includes the Lake Whatcom landscape.

<u>Species</u>	<u>Status**</u>	<u>Species</u>	<u>Status**</u>
Western Toad (<i>Bufo boreas</i>)	FSC, SC	Yuma Myotis (<i>Myotis yumanensis</i>)	FSC
Long-eared Myotis (<i>Myotis evotis</i>)	SM, FSC		

** FT - Federal Threatened, FSC- Federal Species of Concern, ST - State Threatened,
SE - State Endangered, SC - State Candidate, SM - State Monitor, SS - State Sensitive

Wildlife species of interest documented in the Lake Whatcom Landscape:**Common Loon**

Common loons breed on large, wooded lakes with large populations of fish. Though there have been confirmed breeding pairs in Whatcom County, there are no confirmed nests in the WDFW database, though apparently adult loons with young have been observed on the lake (Eissinger, personal communication. 2001). Loons have been recorded on the lake during winter months. The species is a State Candidate for listing.

Nests are usually located in forested areas on shorelines of islands and the mainland. Nests may also occur on masses of emergent vegetation near shore. Several studies have shown that loons prefer to nest on islands and may experience higher success rates at these protected sites (McIntyre and Mathisen 1977).

Common loons are vulnerable to shoreline alteration and development, fluctuations of water levels during breeding, and human disturbance in the vicinity of nesting areas. Heavy recreational use and shoreline development may discourage loons from occupying otherwise suitable habitat.

Great Blue Heron

Great blue herons are found near all types of saltwater and freshwater wetlands at all elevations, though they are more common at lower elevations. Feeding primarily on aquatic animals in shallow water, it is not unusual to find them foraging in uplands for mice and voles, especially in winter months. Herons are fairly common throughout the planning area, primarily associated with wetland areas, roadside ditches and open areas, such as the golf course. No known nesting colonies exist within the planning area, but complete inventories have not been conducted.

Hérons are colonial breeders, generally nesting in deciduous or coniferous trees near water and feeding areas. Although smaller trees and shrubs can be used for nesting sites, colonies are generally located in the tallest trees available. Great blue herons are a State Monitor species in Washington.

Great blue herons are shy birds and are sensitive to disturbance, though some studies suggest that some breeding colonies may become habituated to human activities. Conversely, herons that have experienced little disturbance in the past may be unlikely to tolerate human activities near breeding sites. Should breeding colonies be identified on state-managed lands within the planning area, site specific management plans should be developed in cooperation with WDFW in order to maintain the integrity and productivity of the breeding colony.

Osprey

Ospreys are summer residents in western Washington, breeding from Bellingham to the Columbia River. Associated with productive bodies of water, ospreys feed exclusively on live fish captured at or near the water=s surface. Nests consist of a mass of large sticks located at the top of live trees or dead snags with flat broken tops. They exhibit strong nest site fidelity and return to the same nest year after year. Ospreys have been recorded nesting near Lake Whatcom since the mid-1960's, with the most recent nest site being identified along the Lake Louise road, near Sudden Valley. Osprey are a State Monitor species in Washington.

Breeding ospreys vary in their ability to tolerate human disturbance near active nests. Those birds nesting in areas where human activity is high may be more tolerant of human disturbance than those birds nesting in areas where human activity is less frequent. Disturbance during incubation and the early nesting stages are likely most critical, since adults may leave the nest for extended periods, which could be fatal to developing eggs and young nestlings. Maintaining appropriate buffers which restrict human activities, including timber harvest, around active nests are important components to maintaining habitat and reproductive success for ospreys. Additionally, eliminating the application of pesticides, especially organochlorines, in watersheds used by ospreys, is recommended.

Bald Eagle

Due to extensive recovery efforts, particularly the banning of certain pesticides in the U.S., the bald eagle has returned to much of its historical range in North America. In Washington, bald eagles are mainly found along the shores of saltwater and freshwater lakes and rivers. Recently, the species was downgraded from a Federal Endangered to Federal Threatened species over its entire range outside of Alaska and remains a State Threatened species in Washington. Breeding territories are primarily located in uneven-aged coniferous stands that contain some old-growth components. There are two known bald eagle nesting territories within the planning area: one near the outflow for Lake Whatcom on private land and another located in Section 9, T37N, R4E on state land. There are alternate nests in this territory, likely built by the same breeding pair.

A typical nest tree is dominant or co-dominant with the overstory, is usually alive but often has a broken or dead top, and contains limbs capable of supporting the nest. Often nest trees provide an unobstructed view of the water. The nests are typically consist of a large mass of branches in the top 20 feet in a large tree, usually next to the tree trunk and generally near water. Bald eagles mate for life and exhibit high site fidelity to nest locations, which can result in some nests becoming huge with continued use, weighing in excess of two tons. Eagles are very territorial during nesting and will aggressively keep other eagles out of their nesting territory, which

averages a radius of 1.6 miles in western Washington (Grubb 1980).

Human disturbance can negatively impact breeding eagles, though some pairs appear quite habituated to human presence. Known nest sites on state-managed lands will be protected through the development of a Site Management Plan, in cooperation with WDFW. This plan would identify a protected core area where any activities would be prohibited and a buffer area where activities would be conditioned so as to minimize potential disturbance to nesting eagles. Any proposed management activities within 0.5 miles of a known bald eagle nest site will be consistent with the conditions identified in the Site Management Plan.

Northern Goshawk

The northern goshawk is an interior forest raptor which inhabits forested regions of Washington. Only a few breeding territories have been recorded from the northwest portion of the state. An adult goshawk with juveniles was observed in 1979 on private property in Section 8, T37N, R04E. Presumably, these birds had nested somewhere in the vicinity. The northern goshawk is listed as a Federal Species of Concern and is a State Candidate for listing.

In western Washington, goshawks generally nest in high, closed canopy forests, and are likely associated with mature to older forest habitats. The nest area and the surrounding 25 to 30 acres is the core of activity from courtship to the fledging stage. The goshawk home range may contain up to four alternate nest stands, often used in an alternating fashion from year to year. These nest areas are usually within one mile of each other, are generally similar in structure, and are predominantly located in Douglas-fir stands (Reynolds et. al. 1992).

Post-fledging areas for goshawks include an area of concentrated use after the young leave the nest, until they are no longer dependent on the adults for food. The function of this area is to provide foraging opportunities for the adult female and hiding cover, as well as foraging opportunities, for the fledgling goshawks. Post-fledging areas average approximately 400 acres in size, and consist of forests with dense trees, closed canopies, snags, and down woody debris.

Limited information describing foraging habitat for goshawks is available for Washington. Goshawks generally utilize a variety of forest types for foraging, including stands with variable canopy-closure. It is likely that snags, down logs, and to varying degrees, a developed herbaceous and/or shrub understory, are important habitat components for foraging opportunities. Goshawks are considered principally opportunistic foragers. In the western Cascades of Washington, the diet of goshawks usually consists of Douglas= squirrels, snowshoe hare, Stellar=s jay, and ruffed and blue grouse (WDFW 1997).

Guidelines from the southwest U.S. developed by the Goshawk Scientific Committee (Reynolds

et. al. 1992) recommend that 60% of the average home range of goshawk pairs, approximately 6,000 acres, be comprised of mature and older forest stands, including 20% old forest habitat.

Pileated Woodpecker

In Washington, pileated woodpeckers inhabit mature and old growth forests and second growth forests with significant numbers of large snags and fallen trees. Because of the presence of these habitat components in the Lake Whatcom landscape, pileated woodpeckers are found throughout the area. Generally, the best habitat is conifer stands older than 70 years containing the above structural characteristics, and two or more canopy layers (Bull 1987).

Pileated woodpeckers construct nest cavities in snags or live trees with dead wood, generally excavating through hard outer wood into rotten heartwood. West of the Cascades, the preferred tree species for pileated nests are Douglas-fir and grand fir. Most nest trees are hard snags with bark and broken tops.

Primarily, pileated woodpeckers forage in forests 40 years of age or older. They seldom use clear-cuts, but do forage in thinned areas if logging debris, i.e., down logs and large snags remain. Pileated woodpeckers are considered primary excavators, they excavate large rectangular holes during foraging that may be used by smaller birds for nesting and roosting.

On a landscape basis, leaving at least 14 snags greater than 20 inches dbh per 100 acres will provide suitable nesting habitat for pileated woodpeckers (Pietro et al. 1985). In addition, to provide foraging habitat, large stumps and numerous down logs should be left in various stages of decay. Trees with the greatest potential for immediate use by pileated woodpeckers have old pileated cavities, broken tops, approximately 33% of the limbs and bark remaining, and some decay. Trees with broken tops are the most heavily used for foraging. Identifying potential nest snags for retention in a dispersed pattern throughout a management unit will provide the most benefit to pileated woodpeckers. When creating snags, topping live trees or inoculating them with heartrot fungus at nest height (above 40 feet) is recommended (Bull, 1986).

The U.S. Forest Service has a mandate to maintain viable populations of wildlife species on public lands (USDA Forest Service, 1986). The pileated woodpecker was selected as a management indicator species for old growth conifer forests because its highest densities occur in this habitat condition. The pileated woodpecker is a State Candidate for listing by WDFW.

Vaux=s Swift

Vaux=s swift is the smallest swift in North America and can be found from southeast Alaska south through the western United States and as far south as Venezuela. They are neotropical

migrants that arrive on their breeding grounds in late April to early May, returning to southern wintering areas in mid-August through September. It is not uncommon to see Vaux's swift throughout the planning area during the breeding season.

Built for speed, these aerodynamic birds feed primarily on insects and spiders, soaring above the forest canopy and swooping down to feed on prey, which they capture mid-flight. Often seen feeding alone and in large flocks, Vaux's swifts prefer old-growth and mature coniferous or mixed conifer/deciduous forests. A critical component for nesting is the presence of large, hollow trees that are either dead or alive.

It is believed this species is experiencing a population decline due to the loss of older forest habitat and preferred nesting structures. Vaux's swift is a State Candidate for listing.

Purple Martin

Purple martins are the largest of the North American swallows and are uncommon breeders in Washington. They are generally found near water and nest in natural cavities or manmade structures. Known nesting occurred in 1975 and 1977, just southeast of Bloedel-Donovan Park in bird boxes. Purple martins are a State Candidate for listing in Washington.

They are insectivorous, taking insects on the wing and prefer to forage in open areas associated with moist and wet sites where insects are abundant. Historically, the species likely used old woodpecker cavities in large trees and snags for nesting. Retaining and recruiting large diameter snags, especially near wetlands, are recommended for improving purple martin habitat.

Olive-sided Flycatcher

The olive-sided flycatcher is a neotropical migrant species that breeds in the western U.S. and Canada. This species is considered an indicator species of the coniferous forest biome, though it is occasionally found in mixed deciduous/coniferous forests. Olive-sided flycatchers are associated with older stands, multi-layered canopies and forest openings. Survey data from North American Breeding Bird Surveys provides strong evidence that this species is experiencing significant population declines over most of the breeding range, especially in the west. As no apparent impact is obvious across its broad breeding range, problems may be present on the wintering habitat - low and middle elevation evergreen forests of the Northern and Central Andes, which are one of the most altered habitats in South America. This species is a Federal Species of Concern.

Though uncommon, olive-sided flycatchers occur in suitable habitat in the planning area. They are typically found near older stands, with nearby openings such as meadows, wetlands and

logged areas, where they perch on prominent dead or partially dead trees as they hawk for insects on the wing. Habitat conditions for this species may be improved through silvicultural thinning and by creating openings, which are preferred foraging areas.

Townsend=s Big-eared Bat

Townsend=s big-eared bat is a medium sized bat with very large ears; approximately one-half of it=s total body length. This species is associated with habitats ranging from arid grasslands to coastal forests at an elevational range of sea level to approximately 3,000 feet. It is found throughout the western United States and British Columbia, including Vancouver Island and the Vancouver area. It is most common in coniferous forests during warmer months. In the planning area, a nursery colony was located in 1986 in an abandoned building located in Section 26, T37N, R8E.

Townsend=s Big-eared bats use caves, old mine tunnels and buildings as day and night roosts. Females form maternity colonies ranging in size from a dozen to several hundred adults, preferably in dimly lit areas such as those listed above. This species is exceptionally sensitive to human disturbance. Females will abandon a habitual summer roost if disturbed. Individuals will even move to a different hibernaculum during winter in order to avoid disturbance. Males tend to roost alone and separate from the females. Townsend=s leave their roost approximately an hour after dark and feed several times during the night. Their diet consists primarily of small moths. They will also eat dung beetles, lacewings and flies.

Nursery colonies break up in August when individuals begin to migrate to caves and mine tunnels for hibernation. Townsend=s Big-eared bat has a relatively small home range, moving only about 10 to 65 kilometers between summer roosts and winter hibernacula. Mating occurs between November and February within the winter hibernaculum. Young are most likely born in June.

Townsend=s Big-eared bat is listed as a Federal Species of Concern and is a State Candidate for listing. Besides human disturbance and destruction of summer roosts and winter hibernacula, predation by house cats, screech owls, bobcats and snakes has led to this species= decline.

Tailed Frog

The tailed frog is a small, brownish-green frog that grows to only about two inches. It ranges from western British Columbia south to California and east to Montana and Idaho. It lives in and around annual, clear, cold, swift mountain streams that are free of silt and have bottom substrate of cobbles, large stones and boulders, which are used for protection from the strong current.

The Atail@ of the tailed frog is actually not a tail but the copulatory organ of the male. Unlike most frogs, the tailed frog uses internal fertilization when mating to prevent the swift current from washing away the sperm. Mating takes place in autumn, with females laying eggs the following summer and tadpoles hatching in August.

Tadpoles are easily identifiable due to their large, sucker-like mouths that they use to cling to rocks on the stream bottom while scraping off a diet of algae and diatoms. Tadpoles take two or three years to mature into frogs and do not breed until they are about seven or eight years old. Adults feed nocturnally on both terrestrial and aquatic insects and worms and, unlike other frogs, have no vocalizations.

The tailed frog is a Federal Species of Concern and a State Monitor species. This frog is very susceptible to modifications of it=s habitat. Land management activities that can greatly increase runoff and siltation, such as timber harvesting and forest road construction, are of great concern to tailed frog conservation. Eggs and tadpoles are both very sensitive to abnormal levels of water-born silt. Tailed frogs have been documented as breeding in 1995 along the lower lengths of Austin Creek.

Wildlife species of interest whose geographical distribution includes the Lake Whatcom landscape:

Western Toad

The western toad is a fairly common toad of the West. It is a larger toad that can grow up to five inches in length. It ranges from southern Alaska to northwestern Baja California and is believed to be indigenous to every forest in the Intermountain Region. It lives in a wide variety of habitats, from deserts to alpine meadows, in close proximity to lakes, ponds and slow moving streams. They have been found as high as 12,000 feet in elevation. Unlike many toads, the western toad walks rather than hops and has a chick-like Apeep@ vocalization. It is nocturnal in lower elevations and diurnal in higher elevations. Like other toads, it buries itself in loose soils or in rodent tunnels when inactive in the winter. It feeds primarily on terrestrial invertebrates such as slugs, insects and worms.

From April to June, western toads collect in shallow, cool ponds with sandy bottoms to breed. After breeding females lay thousands of eggs in long strings wrapped around aquatic vegetation in still or slow moving water, which hatch in 3 - 12 days. Six to eight weeks later, the toad larvae transform into juvenile toads. It requires another two to three years before they become sexually mature.

In spite of its relative abundance, the western toad is a Federal Species of Concern and a State Candidate species, due to the apparent decline of some localized populations of the subspecies boreal toad (*Bufo boreas boreas*).

Yuma Myotis

The Yuma Myotis is a small bat that is found across western North America from southern British Columbia to Mexico. It is restricted to low elevation, (below approx. 2300 ft.) coastal forests, Ponderosa pine - Douglas-fir forests and arid grasslands near open water. The Yuma Myotis is more closely associated with water than any other North American bat. In fact, it is one of the few bats observed flying over salt water in the Pacific Northwest.

When not foraging near water they can be found roosting in caves, buildings, underneath bridges and in mines. Mating occurs in the spring. In the summer, females form very large maternity colonies of several hundred adults, where each gives birth to a single young in June or July. Males roost alone or in small groups, but separate from the females. Maternity colonies are deserted by late summer or early fall, but little is known about how Yumas overwinter. Only a few individuals have ever been found during the winter in Washington, and were found in caves.

The Yuma Myotis emerges from its roost around dusk to forage over lakes, ponds and streams. They may travel as much as four kilometers between their roosting and foraging sites. Aquatic insects such as caddis flies, midges and mayflies comprise the bulk of their diet. This bat is such an efficient feeder that it can fill its stomach in only ten to fifteen minutes. After feeding, it retires to a night roost near its foraging area but returns to its day roost by dawn.

Yuma Myotis is quite common and has a low threat of endangerment. However, it is a federal species of concern due to its slight decline as a result of the destruction of suitable roosting sites.

Long-eared Myotis

The long-eared myotis ranges throughout temperate North America, from British Columbia south to the tip of Baja California. This species occurs in a variety of habitats across its range, but is often associated with forested habitats from sea level to more than 9,000 feet in elevation. Presently, the long-eared bat is a "state monitor" (SM) and federal "species of concern" (FSC) in Washington.

As with many bat species, little is known about the behavior and biology of the long-eared bat. Mines have been known to be used as night roosts for this species. During the day, this species may use bark, rock crevices and hollow trees for day roost locations. Females form small

maternity colonies and seem to prefer buildings for this life phase. There is no information on hibernation sites for this species.

The long ears of this species is generally attributed to its hunting style. It is believed this bat often gleans insects from foliage, listening for the slight noises made by insects moving on the vegetation. Moths and beetles make up the majority of its prey.

While this species has not been located within the planning area, it is assumed to be present because of its preference for forested habitats.

III. Uncommon Habitats within the Lake Whatcom Landscape

Uncommon habitats generally occupy a small portion of a landscape but contribute significantly to overall wildlife diversity in a forest environment. These habitats provide refuge for a wide variety of wildlife species, some of which are not found except in association with uncommon habitats. These habitats are considered Apriority@ by WDFW. Priority habitats are those habitat types with unique or significant value to many fish and wildlife species. Unique habitats such as balds, caves, and cliffs play a small but very important role in contributing to the diversity of wildlife species in a landscape. While the geomorphic features of these habitats may be fairly stable, the microclimatic conditions within them are often fragile and easily impacted by outside disturbances. Once impacted, these unique habitats are extremely difficult or impossible to restore. The locations of all uncommon habitats in the planning area are not known. In order to provide more complete information regarding the locations of these habitats, field inspections are necessary.

Wetlands and Riparian Areas

Wetlands are areas that are covered by shallow water or are periodically saturated with the water table at, near, or above the soil surface. Hydric soils occur and vegetation is composed of species which require saturated or seasonally saturated soil conditions for growth and reproduction. Wetland habitats include freshwater marshes, swamps, bogs, seeps, wet meadows, and shallow ponds. Riparian areas are those areas associated with streams, including the stream itself, and the surrounding uplands which have a direct influence on the riparian ecosystem.

Wetlands are characterized by a high diversity, density, and productivity of both plant and animal species. Wetlands and riparian areas provide some of the most important wildlife habitat in forest lands. Wildlife require food, water, cover, and space which includes areas to feed, breed, rear young, hide from predators, rest, and habitats that provide protection from extreme weather. The density, diversity, and structure of vegetation in wetland habitats tends to provide these requirements for a large number of wildlife species. Aquatic and amphibious species are generally found only in these habitats. Many species that either feed or reproduce in water are directly dependent on wetlands or riparian areas. Many other species, although not directly dependent on this type of habitat, tend to use wetlands and riparian areas to a greater degree than upland areas.

Maintaining the hydrologic functions of wetlands, as well as riparian areas, is essential to maintaining the health and function of the entire aquatic ecosystem and contributes to the health of the upland ecosystem as well. Considering the importance of these unique habitats in the ecosystem, protection of forested and non-forested wetlands, as well as maintaining functional riparian areas, should be a major objective in the management plan for this landscape. The

DNR=s *Forestry Handbook, August 1999* procedures PR 14-004-110 and PR 14-004-150 provide management guidelines for identifying and protecting wetlands and riparian areas, respectively, and will be incorporated into the management objectives for the planning area.

While streams abound on state-managed lands within the planning area, sizeable wetlands are more rare due to the steep topography of the area. The most significant wetlands occur in the vicinity of Mirror Lake, though most of this wetland complex occurs on private land. There are a few scattered wetlands between 0.25 - 1.0 acre in size on state-managed lands, all of which will be protected to current management standards. There are frequent smaller wetlands and wet areas (less than 0.25 acres) located throughout the upland area, primarily associated with folds in the underlying sandstone formations. Presently, wetlands less than 0.25 acres in size are not provided protective buffers under current management practices.

Cliffs

A cliff is a steep vertical or overhanging face of rock. Most animal species which use cliffs take advantage of the security found in cracks and ledges of the cliff face to escape from predators. Birds build their nests and small mammals make dens along the rocky ledges. Many raptors, such as the peregrine falcon, prefer cliffs for nesting and roosting because the height of cliffs aids their hunting by giving them a larger field of view and providing them with predictable updrafts and thermal wind currents for soaring.

DNR=s *Forestry Handbook, August 1999* procedure PR 14-004-190 provides management guidelines for identifying and protecting this unique habitat, and will be incorporated into the management objectives for the planning area. Presently, the only recognized cliff habitat is located in a remote area on the eastern side of the lake and was occupied by breeding barn owls in 1997.

Talus

DNR=s Habitat Conservation Plan defines talus as a homogenous area of rock rubble ranging in size from 1 inch to 6.5 feet in diameter. These rock fragments usually accumulate at the base of steep slopes or cliffs. The HCP further defines forested talus as exposed talus with canopy closure greater than 30 percent. Talus fields, both forested and non-forested, play a very important role by providing the habitat needs for a number of unique and dependent wildlife species such as amphibians, reptiles, birds, small mammals such as pikas. DNR=s *Forestry Handbook, August 1999* procedure PR 14-004-170 provides management guidelines for identifying and protecting talus fields, and will be incorporated into the management objectives for the planning area. Presently, no talus fields have been identified within the planning area, but complete inventories have not been conducted.

Caves

Washington Department of Fish and Wildlife (1995) defines a cave as a naturally occurring cavity, recess, void, or system of interconnected passages which occurs under the earth in soils, rock, ice, or other geological formations and which is large enough to contain a human. Though rather broad in this definition, the availability of undisturbed cave sites in the landscape is critical to a number of wildlife species for roosting, breeding, and foraging. Birds such as owls and vultures use shallow recesses and the entrances to deeper caves for roosting and sometimes nesting. Caves provide a more stable temperature and moisture environment than most terrestrial habitats. As a result, a number of bat species are extremely dependent on caves due to the stable environment they provide in order to maintain their bodily functions.

Procedure PR 14-004-180 in DNR's *Forestry Handbook, August 1999* provides management guidelines for protecting caves, which will be incorporated into the management objectives for the planning area. There are no known caves within the planning area.

Balds

Balds are openings in the forest, usually on a hilltop, hillside, or along ridgetops. The ground cover on balds are dominated by native grasses, or moss and forbs may be present and are sometimes abundant. Shrub patches and seedlings, saplings, and trees may be present but the site is open and park-like, unlike the surrounding forest. The sites where balds are found are usually dry, and soils are often shallow, so tree invasion is slow.

Balds are significant as a unique natural grassland in a forested landscape and are an important habitat for a number of plant and animal species. Balds provide significant resources for animals. Invertebrates, birds, and large mammals feed on plants found on balds. The sun reaches the ground on balds, allowing many animals including invertebrates, amphibians, reptiles, and mammals to rest and bask there (Fleckenstein, 1999).

Identified balds are provided protective measures under procedure PR 14-004-220 in DNR's *Forestry Handbook, August 1999*, which will be implemented should this unique habitat be found within the planning area.

V. Appendices

A. Wildlife species known to occur or likely to occur in the Lake Whatcom Landscape.

(Key: FSC= Federal Species of Concern; FT=Federal Threatened; FE= Federal Endangered; SM= State Monitor; SS= State Sensitive; SC= State Candidate; ST= State Threatened; SE= State Endangered;)

Amphibians:

northwestern salamander (*Ambystoma gracile*)
Pacific giant salamander (*Dicamptodon ensatus*)
Oregon Ensatina (*Ensatina eschscholtzi oregonensis*)
western redback salamander (*Plethodon vehiculum*)
Roughskin newt (*Taricha granulosa*)
western toad (*Bufo boreas*) FSC; SC
Pacific tree frog (*Hyla regilla*)
tailed frog (*Ascaphus truei*) FSC; SM
red-legged frog (*Rana aurora*)
bullfrog (*Rana catesbeiana*)

Reptiles

northwestern garter snake (*Thamnophis ordinoides*)
common garter snake (*Thamnophis sirtalis*)

Birds

common loon (*Gavia immer*) SS
pied-billed grebe (*Podilymbus podiceps*)
eared grebe (*Podiceps nigricollis*)
western grebe (*Aechmophorus occidentalis*)
double-crested cormorant (*Phalacrocorax auritus*)
great blue heron (*Ardea herodias*)
green-backed heron (*Butorides striatus*)
Canada goose (*Branta canadensis*)
wood duck (*Aix sponsa*)
green-winged teal (*Anas crecca*)

mallard (*Anas platyrhynchos*)
northern pintail (*Anas acuta*)
gadwall (*Anas strepera*)
American wigeon (*Anas americana*)
ring-necked duck (*Aythya collaris*)
lesser scaup (*Aythya affinis*)
common goldeneye (*Bucephala clangula*)
bufflehead (*Bucephala albeola*)
hooded merganser (*Lophodytes cucullatus*)
common merganser (*Mergus merganser*)
turkey vulture (*Cathartes aura*)
osprey (*Pandion haliaetus*)
bald eagle (*Haliaeetus leucocephalus*) FT; ST
northern harrier (*Circus cyaneus*)
sharp-shinned hawk (*Accipiter striatus*)
Cooper's hawk (*Accipiter cooperii*)
northern goshawk (*Accipiter gentilis*) FSC; SC
red-tailed hawk (*Buteo jamaicensis*)
golden eagle (*Aquila chrysaetos*) SC
American kestrel (*Falco sparverius*)
merlin (*Falco columbarius*) SC
peregrine falcon (*Falco peregrinus*) FSC; SE
gyrfalcon (*Falco rusticolus*)
blue grouse (*Dendragapus obscurus*)
ruffed grouse (*Bonasa umbellus*)
Virginia rail (*Rallus limicola*)
sora rail (*Porzana carolina*)
American coot (*Fulica americana*)
killdeer (*Charadrius vociferus*)
spotted sandpiper (*Actitis macularia*)
common snipe (*Gallinago gallinago*)
ring-billed gull (*Larus delawarensis*)
glaucous-winged gull (*Larus glaucescens*)
rock dove (*Columba livia*)
band-tailed pigeon (*Columba fasciata*)
mourning dove (*Senaida macroura*)
common barn owl (*Tyto alba*)
western screech owl (*Otis kennicottii*)
great horned owl (*Bubo virginianus*)
snowy owl (*Nyctea scandiaca*)

northern pygmy owl (*Glaucidium gnoma*)
 barred owl (*Strix varia*)
 long-eared owl (*Asio otus*)
 northern saw-whet owl (*Aegolius acadicus*)
 common nighthawk (*Chordeiles minor*)
 black swift (*Cypseloides niger*)
 Vaux=s swift (*Chaetura vauxi*) SC
 rufous hummingbird (*Selasphorus rufus*)
 belted kingfisher (*Ceryle alcyon*)
 red-breasted sapsucker (*Sphyrapicus ruber*)
 downy woodpecker (*Picoides pubescens*)
 hairy woodpecker (*Picoides villosus*)
 northern flicker (*Colaptes auratus*)
 pileated woodpecker (*Dryocopus pileatus*) SC
 olive-sided flycatcher (*Contopus borealis*) FSC
 western wood-pewee (*Contopus sordidulus*)
 Pacific slope flycatcher (*Empidonax difficilis*)
 tree swallow (*Tachycineta bicolor*)
 purple martin (*Progne subis*) SC
 violet-green swallow (*Tachycineta thalassina*)
 northern rough-winged swallow (*Stelgidopteryx serripennis*)
 barn swallow (*Hirundo rustica*)
 gray jay (*Perisoreus canadensis*)
 Stellar=s jay (*Cyanocitta stelleri*)
 American crow (*Corvus brachyrhynchos*)
 common raven (*Corvus corax*)
 black-capped chickadee (*Parus atricapillus*)
 chestnut-backed chickadee (*Parus rufescens*)
 bushtit (*Psaltirparus minimus*)
 red-breasted nuthatch (*Sitta canadensis*)
 brown creeper (*Certhia americana*)
 Bewick=s wren (*Thryomanes bewickii*)
 house wren (*Troglodytes aedon*)
 winter wren (*Troglodytes troglodytes*)
 marsh wren (*Cistothorus palustris*)
 American dipper (*Cinclus mexicanus*)
 golden-crowned kinglet (*Regulus satrapa*)
 ruby-crowned kinglet (*Regulus calendula*)
 Townsend=s solitaire (*Myadestes townsendi*)
 Swainson=s thrush (*Catharus ustulatus*)

American robin (*Turdus migratorius*)
 varied thrush (*Ixoreus naevius*)
 cedar waxwing (*Bombycillia cedrorum*)
 northern shrike (*Lanius excubitor*)
 European starling (*Sturnus vulgarus*)
 solitary vireo (*Vireo solitarius*)
 Hutton=s vireo (*Vireo huttoni*)
 warbling vireo (*Vireo gilvus*)
 orange-crowned warbler (*Vermivora celata*)
 Nashville warbler (*Vermivora ruficapilla*)
 yellow warbler (*Dendroica petechia*)
 yellow-rumped warbler (*Dendroica coronata*)
 black-throated gray warbler (*Dendroica nigrescens*)
 Townsend=s warbler (*Dendroica townsendi*)
 MacGillivray=s warbler (*Oporornis tolmiei*)
 common yellowthroat (*Geothlypis trichas*)
 Wilson=s warbler (*Wilsonia pusilla*)
 western tanager (*Piranga ludoviciana*)
 black-headed grosbeak (*Pheucticus melanocephalus*)
 spotted towhee (*Pipilo erythrophthalmus*)
 chipping sparrow (*Spizella passerina*)
 fox sparrow (*Passerella iliaca*)
 song sparrow (*Melospiza melodia*)
 golden-crowned sparrow (*Zonotrichia atricapilla*)
 white-crowned sparrow (*Zonotrichia leucophrys*)
 dark-eyed junco (*Junco hyemalis*)
 red-winged blackbird (*Agelaius phoeniceus*)
 Brewer=s blackbird (*Euphagus cyanocephalus*)
 brown-headed cowbird (*Molothrus ater*)
 purple finch (*Carpodacus purpureus*)
 house finch (*Carpodacus mexicanus*)
 red crossbill (*Loxia curvirostra*)
 pine siskin (*Carduelis pinus*)
 American goldfinch (*Carduelis tristis*)
 evening grosbeak (*Coccothraustes vespertinus*)

Mammals

Virginia opossum (*Didelphis virginiana*)
 Pacific water shrew (*Sorex bendirii*)

water shrew (*Sorex palustris*)
vagrant shrew (*Sorex vagrans*)
Trowbridge=s shrew (*Sorex trowbridgii*)
shrew-mole (*Neurotrichus gibbsi*)
Pacific mole (*Scapanus orarius*)
Townsend=s mole (*Scapanus townsendii*)
big brown bat (*Eptesicus fuscus*)
silver-haired bat (*Lasionycteris noctivagans*)
hoary bat (*Lasiurus cinereus*)
California myotis (*Myotis californicus*)
Long-eared Myotis (*Myotis evotis*) SM, FSC
little brown myotis (*Myotis lucifugus*)
long-legged myotis (*Myotis volans*)
Yuma myotis (*Myotis yumanensis*) FSC
Townsend=s big-eared bat (*Plecotus townsendii*) FSC; SC
coyote (*Canis latrans*)
red fox (*Vulpes vulpes*)
black bear (*Ursus americanus*)
raccoon (*Procyon lotor*)
river otter (*Lutra canadensis*)
striped skunk (*Mephitis mephitis*)
ermine (*Mustela erminea*)
long-tailed weasel (*Mustela frenata*)
mink (*Mustela vison*)
spotted skunk (*Spilogale putorius*)
mountain lion (*Felis concolor*)
bobcat (*Lynx rufus*)
black-tailed deer (*Odocoileus hemionus columbianus*)
mountain beaver (*Aplodontia rufa*)
northern flying squirrel (*Glaucomys sabrinus*)
Townsend=s chipmunk (*Tamias townsendii*)
Douglas= squirrel (*Tamiasciurus douglasii*)
beaver (*Castor canadensis*)
bushy-tailed woodrat (*Neotoma cinerea*)
deer mouse (*Peromyscus maniculatus*)
southern red-backed vole (*Clethrionomys gapperi*)
long-tailed vole (*Microtus longicaudus*)
Oregon vole (*Microtus oregoni*)
Townsend=s vole (*Microtus townsendii*)
muskrat (*Ondatra zibethicus*)

house mouse (*Mus musculus*)
Norway rat (*Rattus norvegicus*)
Pacific jumping mouse (*Zapus trinotatus*)
porcupine (*Erethizon dorsatum*)
pika (*Ochotona princeps*)
snowshoe hare (*Lepus americanus*)
eastern cottontail (*Sylvilagus floridanus*)

Historical Wildlife Species Extirpated from Planning Area

Birds

marbled murrelet (*Brachyramphus marmoratus*) FT; ST

spotted owl (*Strix occidentalis*) FT; SE

Mammals

gray wolf (*Canis lupus*) FE; SE

grizzly bear (*Ursus arctos*) FT; SE

wolverine (*Gulo gulo*) FSC; SC

marten (*Martes americana*)

fisher (*Martes pennanti*) FSC; SE

lynx (*Lynx canadensis*) FT; ST

elk (*Cervus elaphus*)

VI. Literature Cited

Brooks, D.J.; Grant, G.E. 1992. *New approaches to forest management: background, science issues, and research agenda*. Journal of Forestry. 90(1): 25-28.

Brown, E.R. ed. 1985. *Management of wildlife and fish habitats in forests of western Oregon and Washington*. R6-F&WL-192-1985. Portland, Oregon: United States Department of Agriculture, Forest Service, Pacific Northwest Region.

Bull, E.L. 1987. *Pileated woodpecker ecology*. J. Wildl. Manage., in Rodrick, E. and R. Milner, editors. 1991. *Management recommendations for Washington's priority habitats and species*. Washington Department of Wildlife, Olympia, Washington.

Bull, E.L.; Partridge, A.D. 1986. *Methods of killing trees for use by cavity nesters*, in Rodrick, E. and R. Milner, editors. 1991. *Management recommendations for Washington's priority habitats and species*. Washington Department of Wildlife, Olympia, Washington.

Carey, A.B.; Curtis, R.O. 1996. *Conservation of biodiversity: a useful paradigm for forest ecosystem management*. Wildlife Society Bulletin. 24(4): 610-620.

Carey, A.B.; Elliot, C.; Lippke, B.R.; [and others]. 1996. *A pragmatic, ecological approach to small-landscape management*, Washington Landscape Management Project. Washington Department of Natural Resources, Olympia, Washington.

Debell, D.S.; Curtis, R.O. 1993. *Silviculture and new forestry in the Pacific Northwest*. Journal of Forestry. 91(12): 26-30.

Galindo-Leal, C.; Bunnell, F.L. 1995. *Ecosystem management: implications and opportunities of a new paradigm*. Forestry Chronicle. 71(5): 601-605.

Fleckenstein, J. 1999. *Conservation strategies for uncommon habitats listed in the HCP - balds*. Unpublished. Washington Department of Natural Resources, Olympia, Washington.

Franklin, J.F. 1989. *Toward a new forestry*. American Forests. November/December; 1-8.

Franklin, J.F.; Cromack, K. Jr.; Denison, W.; McKee, A.; Maser, C.; Sedell, J.; Swanson, F.; Juday, G. 1981. *Ecological characteristics of old-growth Douglas fir forests*. United States Department of Agriculture, Forest Service, General Technical Report PNW-118.

Franklin, J.F.; Berg, D.R.; Thornburgh, D.A.; Tappeiner, J.C. 1997. *Alternative silvicultural*

approaches to timber harvesting: variable retention systems. In: Kohm, K.A., Franklin, J.F. eds. *Creating a forestry for the 21st century: the science of ecosystem management.* Washington D.C.: Island Press.

Franklin, J.F.; Dryness, C.T. 1973. *Natural vegetation of Oregon and Washington.* Gen. Tech. Rep. PNW-8. Portland, OR. U.S. Department of Agriculture, Forest Service, Pacific Northwest Range and Experiment Station. 417 p.

Marcot, B.G.; Wisdon, M.J.; Hiram, W.L.; and Castillo, G.C. 1994. *Managing for featured, threatened, endangered, and sensitive species and unique habitats for ecosystem sustainability.* United States Department of Agriculture, Forest Service, General Technical Report PNW-GTR-329. Portland, Oregon.

Maser, C. 1988. *The redesigned forest.* San Pedro, CA: R. And E. Miles. 234 p.

Minckler, L.S. 1989. *Coming revolutions in forestry.* Journal of Forestry. 87(1): 63-64.

Nietro, W.A. et al. 1985. *Snags(wildlife trees),* in Brown, E.R., ed., *Management of wildlife and fish habitats in forests of western Oregon and Washington. Part 1 Chapter narratives.* United States Department of Agriculture, Forest Service, PNW R6-F&WL-192-1985.

Reynolds, R.T.; Block, W.M.; Graham, R.T. and others. 1992. *Management recommendations for the northern goshawk in the southwestern United States.* United States Department of Agriculture, Forest Service. RM-GTR-217. Rocky Mountain Forest and Range Experimental Station. Fort Collins, Colorado.

Thomas, J.W. 1979. *Wildlife habitats in managed forests of the Blue Mountains of Oregon and Washington.* Washington, D.C. United States Department of Agriculture, Forest Service, Agricultural Handbook #553.

Thomas, J.W.; Forsman, E.D.; Lint, J.B. and others. 1990. *A conservation strategy for the northern spotted owl.* United States Interagency Scientific Committee to address the conservation of the northern spotted owl. Portland, Oregon.

Thomas, J.W.; Raphael, M.; Meslow, E.C.; Holthausen, R. 1993. *Forest ecosystem management: an ecological, economic, and social assessment.* Report of the Forest Ecosystem Management Team (FEMAT). United States Government Printing Office: 1993-793-071.

Washington Department of Fish and Wildlife. 1995. *Draft priority habitat management recommendations: snags.* Washington Department of Fish and Wildlife, Olympia, Washington.

Washington Department of Fish and Wildlife. 1997. *Draft priority species management recommendations: northern goshawk*. Washington Department of Fish and Wildlife, Olympia, Washington.